HOLEC RIDDERKERK

DOUBLE-DECKER TRAIN, TYPE IRM

Electrical Multiple Units for Netherlands Railways (NS)

During 1994 the Netherlands Railways will take delivery of new EMUs for regional railway applications. The total order consists of 81 trains (47 4-car and 34 3-car trains) and will be built by Talbot, Aachen. The first train should be delivered in January 1994 and the last in April 1996.

The EMUs will be equipped with a Holec three-phase drive system which includes AC induction motors, regenerative braking capabilities and all related control equipment. This substantially reduces energy consumption and total life-cost compared with more traditional designs. The passenger compartments and the driver cabs will be airconditioned. The IRM train will be equipped with a diagnostics system. The driver will get a warning on his control panel when there is a failure.

Drive system

The three-phase drive system is based on Holec's High Power Drive (HPD) module. The drive consists of 5 of these modules and is identical to the inverters of four-car EMUs ordered by Indonesian Railways and two-car EMUs ordered by Netherlands Railways (Types KRL and SM-90 respectively) and by British Rail (Class 323). The 5 modules consist of three modules for the inverter, one for the line chopper and one for the braking chopper. The EMUs each consist of two driven cars and one or two intermediate trailer cars.

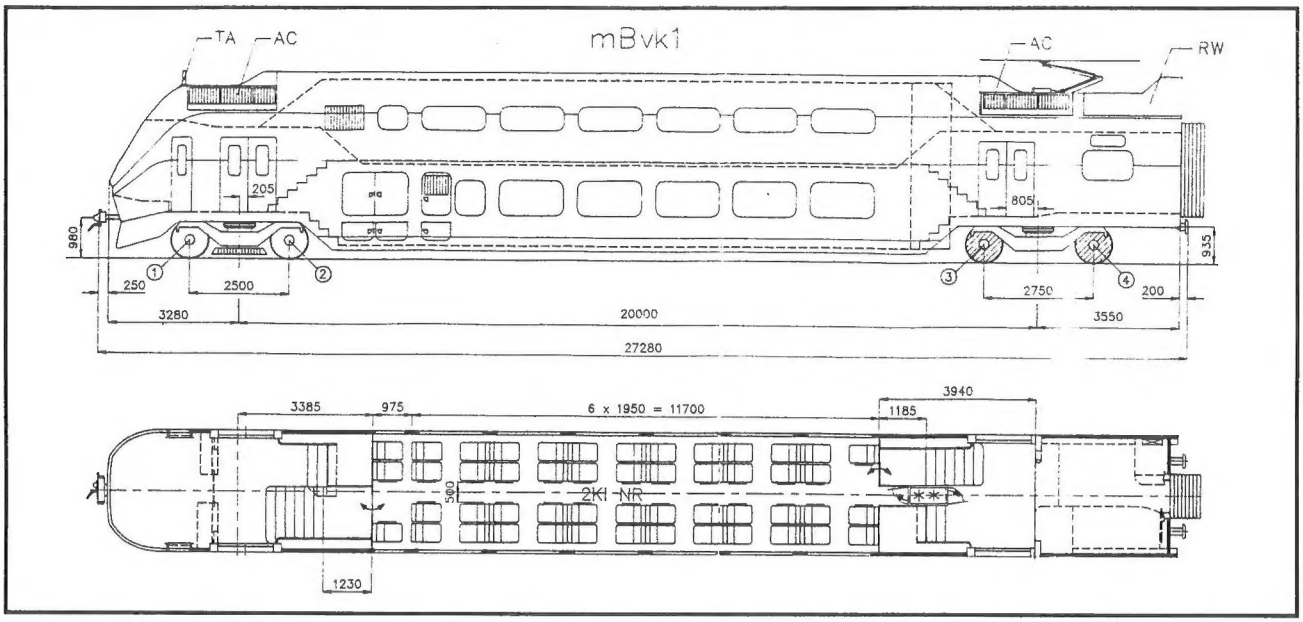
On-board power supply

To supply all low-voltage equipment including airconditioning, each motorcar has a 120 kW 1500 VDC to 500 VDC converter. The 500 VDC hatch is connnected in parallel. This 500 VDC bus supplies:

- Motorcar
  2 x 25 kVA converter
  500 VDC / 3x380 VAC 50 Hz
  for fans etc.; with battery charging (110 VDC) for lighting etc.

- Motorcar
  2 x 20 kVA converter
  500 VDC/ 3x380VAC 18 Hz up to 3x286 VAC 67 Hz
  for supply of the airco unit in an intermediate car.

- Intermediate car
  2 x 20 kVA with the same specifications as the above mentioned 20 kVA converter.



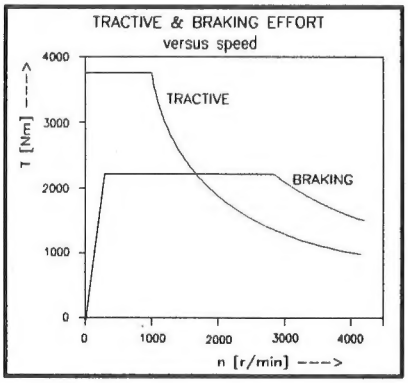
The 20 kVA converters are similar. The frequency of the airco converters is controlled by the airco control system.

Diagnostic system

The trainset will be equipped with a diagnostic system. Each trainset has a monitor in the intermediate car. After experience with the train communications of SM-90 the system will be extended to a system with a monitor in each cab. This will give information on the status of all coupled trainsets.

All intelligent systems e.g. drive control, airco control, brake control, door control are connected by an RS 485 link. Per three car trainset, 36 nodes are connected to two virtually identical links.

The Netherlands Railways are themselves the main contractors. Car body, airco and doors are to be delivered by Talbot.



Technical Data

type	three-car IRM EMU and four-car IRM EMU
axle sequence	2'Bo' + 2'2'(2'2') + Bo'2'
track gauge	1435 mm
trainset length	3-car: 81060 mm 4-car: 107560 mm
body width	3020 mm
passenger capacity	3-car: 285 seats, incl. 10 tip-up seats 4-car: 392 seats, incl. 20 tip-up seats
tare weight	3-car: 184 ton 4-car: 235 ton
power supply	1500 VDC
maximum speed	160 km/h
drive	4 force-ventilated AC induction motors, 402 kW, 4339 rpm max.
gear ratio	73 : 17
wheel diameter	920 - 880 - 840 mm
starting acceleration	3-car: 0.68 m/s^2 4-car: 0.52 m/s^2
braking deceleration	1,05 m/s^2
emergency braking	1,1 m/s^2

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